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AUTHOR Moreau, Richard A.; McIntire, Walter G.
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ABSTRACT

The relationship between educational expenditures and pupil achievement has been a topic of increasing interest to legislators, school boards, and more recently, the courts. This paper examines the relationships among various measures of school district wealth and spending, other school district characteristics, and student achievement within the context of a state with a majority of small and rural school systems. Data were collected from all Maine elementary school districts that provided instruction to five or more students in grade 8 in 1991-92. For each of the 193 districts studied, pupil achievement was measured as mean grade-8 scores on the Maine Educational Assessment Tests for the 3 years ended 1991-92. Four school district characteristics differentiated between the 30 highest-achieving and the 24 lowest-achieving districts. High-achieving districts spent more per pupil, had a larger property tax base per pupil, had higher median family income, and employed a higher percentage of elementary teachers with a graduate degree. Achievement was not significantly related to pupil-teacher ratio or district tax levies. Higher percentages of elementary teachers with graduate degrees were found in school systems with higher levels of per pupil expenditures and higher median family incomes. The expected correlation between achievement and socioeconomic status was somewhat smaller than has been found nationally, perhaps because of Maine's generally low income levels. (SV)

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SELECTED SCHOOL DISTRICT FACTORS AND GRADE EIGHT PUPIL ACHIEVEMENT IN MAINE

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RICHARD A. MOREAU

AND

WALTER G. MCINTIRE, Ph. D.

COLLEGE OF EDUCATION
UNIVERSITY OF MAINE
Orono, Maine

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and grade eight achievement
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Abstract

Research designed to investigate the influences of school district fiscal characteristics and practices on pupil achievement is of particular interest to legislators and educational policy makers. Utilizing data from Maine's elementary school systems (N=193), this paper examines school system expenditures and community property valuations in relation to SES, tax millage levies, pupil/teacher ratios, and percent of elementary teachers with graduate degrees. Maine's high- and low-achieving school systems are grouped, and substantive mean differences in per pupil expenditures, property valuations, and median family incomes are found.

A correlation matrix employing all variables is provided. The percent of elementary teachers with graduate degrees is positively associated with pupil achievement.

Introduction

The relationship between educational expenditures and pupil achievement has been a research topic of increasing interest to legislators, school boards, and more recently, the courts (Wise & Gendler, 1989). Undergirding this interest is the belief that fiscal factors are related to the quality of education available to pupils, and ultimately, to the production of student achievement (Hedges, Laine, & Greenwald, 1993).

While the relationships between economic variables and pupil achievement has been the focus of a large body of research, the results have been inconsistent and controversial (Hanusheck, 1989). Monk (1990) asserted that research that included all school systems within a single legislative jurisdiction was needed, as interstate differences in school funding formulas, teacher certification requirements, etc., made comparative studies impractical. In addition, the classroom and school were considered inappropriate levels for analysis, as expenditure and policy differences accounted for variance at the school system level. Thus, the data on the population of Maine school systems provide a unique opportunity to illuminate issues of contemporary concern, particularly within the context of states with a majority of small and/or rural school systems.

Method

This study examined grade eight pupil achievement in all Maine school systems that provided instruction to five or more grade eight pupils (N=193). To provide congruency, all measures included in the study are specific to the 1991-92 school year. For each school system, pupil achievement is measured by mean grade eight scores on the Maine Educational Assessment Tests in 1989-90, 1990-91, and 1991-92. Three-year mean scores provided a "leveling" of the effect that might result from atypical group performance in any single year. Mean scores in reading, writing, and mathematics were aggregated to the system-level to establish a measure of each system's pupil achievement (ACH).

While the Maine Educational Achievement Test is administered to all pupils in grades four, eight and eleven, the grade eight results were selected in order to examine the temporal effects of schooling and to avoid the specification and measurement errors associated with secondary dropout and tracking effects. In addition, a significant number of Maine school districts do not operate secondary schools, resulting in a "blending" of community characteristics within system-level data beyond grade eight.

The variables of interest are defined as follows:

1. Per Pupil Expenditure (PPE): Audited elementary (K-8) operating expenditure for 1991-92 divided by elementary

enrollment. Operating expenditures do not include the cost of debt service payments.

2. Per Pupil Valuation (PPV): The assessed valuation of each school system (weighted aggregate for school systems that serve more than one municipality) divided by total enrollment.

3. Socioeconomic Status (SES): The median family income (1990 census) for each school system (weighted aggregate when necessary).

4. Effort (EFFORT): Each system's mill levy for schools.

5. Masters (MASTERS): The percent of elementary teachers in each system who possess a Master's degree.

6. Pupil/Teacher Ratio (PTR): Each system's elementary enrollment divided by the number of full-time equivalent (FTE) elementary teachers employed.

Table 1 presents summary statistics on data from the 193 elementary school systems in Maine.

Table 1. Data from all Maine school systems (N=193).

VARIABLE	MEAN	S. D.	MINIMUM	MAXIMUM
ACH	283	43	135	388
PPE	3,387	715	2,388	8,147
PPV	348,948	309,075	29,024	1,976,961
SES	27,162	6,644	11,630	64,358
EFFORT	9.58	2.09	3.05	15.74
MASTERS(%)	33.92	14.17	0	74.73
PTR	14.48	5.01	4.2	20.6

The data indicate that large differences exist among Maine school systems. The greatest range is found in

municipal property valuations in support of each pupil, with Maine's "poorest" system at $29,000 per pupil, and "richest" at almost $2,000,000. The magnitude of the range is noteworthy when examined in relation to EFFORT, as one Maine community raised 3 mills for schools, while the average Maine community appropriated slightly under 10 mills. Median family income (SES) also provided a significant range among Maine school systems. The highest spending school system expended $4,760 per pupil above the state average.

Table 2 shows data regarding Maine school systems after grouping by level of achievement. Those systems with three-year mean MEAs greater that 325 are identified by "H" (N=30), and those with mean MEA scores less than 235, are identified by "L" (N=24).

Table 2. Maine's High- and Low-Achieving School Systems.

Variable	Mean	S. D.	Minimum	Maximum
PPE - H	4,069	595.16	3,100	6,154
PPE - L	3,720	462.33	3,074	4,523
PPV - H	491,108	306,580	98,089	1,511,751
PPV - L	235,610	201,790	79,333	1,076,208
SES - H	31,707	7,097	21,576	47,642
SES - L	22,945	5,167	14,398	32,014
EFFORT - H	9.78	2.50	3.05	15.74
EFFORT - L	9.33	2.11	5.16	12.60
MASTERS - H	42.72	12.68	22.00	67.00
MASTERS - L	28.77	13.99	0.0	57.10
PTR - H	14.26	2.05	9.54	17.50
PTR - L	13.12	3.11	4.20	16.97

PPE, PPV, SES, and MASTERS clearly differentiate between high- and low-achieving school systems, with high achieving systems spending more per pupil; having a larger property tax base in support of each pupil; and employing a larger percentage of teachers with a graduate degree. Low achieving systems appear to be making an equivalent effort in relation to property tax levies in support of schools. Surprisingly, pupil/teacher ratios indicate essentially no difference between high- and low-achieving school systems.

Correlation coefficients between the variables for all 193 Maine elementary school systems are presented in Table 3. Those significant correlations (p=.05) are identified with an asterick (*).

Table 3. Correlation Matrix (N=193).

	ACH	PPE	PPV	SES	EFFORT	MASTERS	PTR
ACH	-						
PPE	.11	-					
PPV	.19*	.47*	-				
SES	.41*	.07	.08	-			
EFFORT	.10	-.01	-.56*	.27*	-		
MASTERS	.31*	.26*	.07	.37*	.06	-	
PTR	.11	-.24*	.18*	.26*	.14	-.01	-

The correlations indicate a significant negative relationship between per pupil valuation and mills raised for schools, and a moderate positive correlation between per pupil valuation and per pupil expenditure. As expected, Maine communities with high property valuations tend to have lower tax levies for schools, while spending more funds per pupil.

The percent of elementary teachers who possess a Master's degree is associated positively and significantly with high pupil achievement, and those teachers tend to be located in school systems that are characterized by higher levels of per pupil expenditures and higher median family incomes.

Lower pupil/teacher ratios are associated with those school systems that have higher levels of per pupil expenditure. Those Maine communities that have higher median family incomes tend to be more supportive of funding for schools through increased millage.

SES, measured by median family income, is shown to have a significant positive relationship with pupil achivement in Maine (r=.41). This correlation, while expected, is somewhat smaller than national SES measures, and may be explained by Maine's generally low income levels.

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